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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/681,765	10/08/2003	Holger Winkelmann	8540G-000161	8289

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EXAMINER
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ECHELMAYER, ALIX ELIZABETH

ART UNIT	PAPER NUMBER
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1745

MAIL DATE	DELIVERY MODE
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06/29/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/681,765

Applicant(s)

WINKELMANN ET AL.

Examiner

Alix Elizabeth Echelmeyer

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2,5-11,13-23,29 and 30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-11,13-23,29 and 30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 2-27-07.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. This Office Action is in response to the amendment filed April 11, 2007. Claims 1, 5-10 and 29 have been amended. Claims 3, 4, 12, 24-28 and 31-33 have been cancelled. Claims 1, 2, 5-11, 13-23, 29 and 30 are pending and are rejected finally for the reasons given below.

### ***Claim Rejections - 35 USC § 112***

2. The rejections of claims 5-10 are withdrawn in light of the amendment filed April 11, 2007.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2, 5-11, 13-15, 17-23, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. (US Pre-Grant Publication 2002/0098396) in view of Heung (US Patent 6,015,041).

Kobayashi et al. teach a fuel cell system including a hydrogen storage tank, a tank containing a hydrogen-occluding alloy, and a heat exchanging means to transfer the heat generated in the hydrogen-occluding alloy containing tank to the fuel cell

(Figure 1, [0018]-[0022]). The tank would inherently be made of a thermally-conductive material, since the purpose of the tank is to transfer heat.

The system also includes means for discharging hydrogen from the hydrogen-occluding alloy ([0025]).

As for claims 19-23, Kobayashi et al. teach that  $\text{LaNi}_5$  as a hydrogen-occluding alloy ([0064], [0066]).

Regarding claims 17, 18 and 29, Figure 2 of the current application indicates that  $\text{LaNi}_5$  has an equilibrium pressure for absorption of hydrogen at 25°C at less than 0.5 atm.

Regarding claim 2, Kobayashi et al. teach one tank having one channel for the occlusion of hydrogen, but fail to teach a plurality of flow channels. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a plurality of channels, since more channels would expose a greater surface area of metal to hydrogen, generating more heat for the warm-up of the fuel cell. It has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. MPEP 2144.04 (VI).

As for claims 5-10, Kobayashi et al. teach the use of water, which is electrically conductive, to transfer heat from the metal hydride tank to the fuel cell. Kobayashi et al. are silent on the arrangement of the water channels within the fuel cell. It would have been obvious to one having ordinary skill in the art at the time the invention was made to place the water channels, or heating elements, in various configurations within the fuel cell stack, since this would allow for more control over how the stack was heated,

depending on where heat is required for efficient warm-up of the fuel cell. It has been held that rearranging parts of an invention involves only routine skill in the art. MPEP 2144.04 (VI).

Regarding claims 1, 29 and 30, Kobayashi et al. do not teach that the hydrogen-occluding alloy is in particle form or the filter.

Heung teaches an apparatus for storing and releasing hydrogen. The hydrogen is stored in a metal hydride that is in ground particle form. The apparatus comprises chambers divided by aluminum foam for containing the particles of metal hydride. A filter may be provided within the apparatus to allow hydrogen to flow but prevent particles from escaping (abstract).

The filter of Heung would inherently have pores smaller than the diameter of the metal hydride, since the pores would be required to allow hydrogen to flow but could not be larger than the diameter of the metal hydride since that would allow the particle to escape, rendering the filter ineffective.

It would be desirable to use fine particles of a hydrogen occluding metal as taught by Heung since the smaller particle size would expose a larger surface area of the material to hydrogen, generating more heat.

It would be advantageous to provide a filter to prevent the escape of metal hydride particles since, if the particles escaped, stored hydrogen would be lost to the system and the hydrogen flow path could become contaminated or blocked.

Regarding claims 11 and 13-15, the aluminum foam of Heung is used because it improves heat transfer and holds the solid hydrogen storage medium in separate cells (column 2 lines 10-11).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use fine particles of a hydrogen occluding metal since the smaller particle size would expose a larger surface area of the material to hydrogen, generating more heat. Further, it would have been obvious to provide a filter to prevent the escape of escape of metal hydride particles since, if the particles escaped, stored hydrogen would be lost to the system and the hydrogen flow path could become contaminated or blocked. Additionally, it would have been obvious to provide a body of aluminum foam since it improves heat transfer and holds the solid hydrogen storage medium in separate cells.

5. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. in view of Heung as applied to claim 15 above, and further in view of Shreir et al. (Corrosion (3<sup>rd</sup> Edition)).

The teachings of Kobayashi et al. and Heung as discussed above are incorporated herein.

Kobayashi et al. in view Heung fail to teach or render obvious the use of  $\text{AlMg}_3$  as the storage container of the hydrogen absorbing material.

Shreir et al. teach that  $\text{AlMg}_3$  is an alloy having very good resistance to atmospheric attack and provides very good protective anodizing.

It would be desirable to use  $\text{AlMg}_3$  in the tank of Kobayashi et al. in view of Ishikawa et al. since it would fare well in the harsh conditions of the fuel cell system, as indicated by the properties taught by Shreir et al.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use  $\text{AlMg}_3$  in the tank of Kobayashi et al. in view of Heung since it would fare well in the harsh conditions of the fuel cell system, as indicated by the properties taught by Shreir et al.

### ***Response to Arguments***

6. Applicant's arguments have been considered but are moot in view of the new grounds of rejection.

### ***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Art Unit 1745

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PRIMARY EXAMINER